

**What is claimed is:**

1. A method of manufacturing a planar waveguide, comprising the steps of:
  - providing a glass substrate;
  - forming a surface layer on said glass substrate by means of ion exchange process where the refractive index of said surface layer is higher than that of said glass substrate;
  - forming a waveguide pattern on said surface layer of said glass substrate by photolithography and etching method; and
  - forming a cladding layer on the entire surface including the waveguide pattern.
2. The method of manufacturing a planar waveguide as claimed in claim 1, wherein the refractive index of said glass substrate is 1.45 ~ 1.60.
3. The method of manufacturing a planar waveguide as claimed in claim 1, wherein said glass substrate is made of one of soda-lime silicate glass, aluminosilicate glass and borosilicate glass.
4. The method of manufacturing a planar waveguide as claimed in claim 1, wherein said ion exchange process employs either a thermal ion exchange method or an electric field assisted ion exchange method.
5. The method of manufacturing a planar waveguide as claimed in claim

4, wherein a molten salt that is used in the ion exchange processes includes one of a nitrate, a sulfate and a chlorate compound which contains one or more ions within  $K^+$ ,  $Ag^+$ ,  $Cs^+$ ,  $Li^+$ ,  $Rb^+$  and  $Tl^+$  ions.

6. The method of manufacturing a planar waveguide as claimed in claim 5, wherein said molten salt is a mixture where one of a nitrate, a sulfate and a chlorate compound which contains  $Na^+$  ions and one of a nitrate, a sulfate and a chlorate compound which contains one or more ions within  $K^+$ ,  $Ag^+$ ,  $Cs^+$ ,  $Li^+$ ,  $Rb^+$  and  $Tl^+$  ions are mixed at a given ratio.

7. The method of manufacturing a planar waveguide as claimed in claim 1, wherein an etching process for forming the waveguide pattern is implemented by means of either a dry etch using reactive ion etching method or a wet etch using diluted fluoric acid.

8. The method of manufacturing a planar waveguide as claimed in claim 1, wherein said cladding layer is made of one of polymer, glass and crystalline oxide which have a refractive index same to or lower than that of glass substrate.

9. The method of manufacturing a planar waveguide as claimed in claim 8, wherein said polymer is either a resin of poly siloxane series, poly acrylate series, poly ether series, poly ester series or poly imide series having a refractive index of 1.45 ~ 1.60.

10. The method of manufacturing a planar waveguide as claimed in claim 8, wherein said polymer is one of a thermally curable resin and an UV curable resin.